REGEPE ENTREPRENEURSHIP AND SMALL BUSINESS JOURNAL

PUBLISHER ANEGEPE Associação Nacional de Estudos em Empreendedorismo e Gestão de Pequenas Empresas

ISSN: 2965-1506 v.14, Jan. / Dec., 2025 https://regepe.org.br/

Research Article

Business model development in startups: A study of causation, effectuation and bricolage

Renato Machado Costa[a], Reed Elliot Nelson[b], and Marcelo Caldeira Pedroso[a]

[a]*Universidade de São Paulo, São Paulo, Brasil*
[b]*Fundação Dom Cabral, Belo Horizonte, Brasil*

Open access

Check for updates

Open Science

Editorial Details

Sistema double-blind review

Article History
Received : *Jun. 29, 2024*
Accepted : *Jan. 13, 2025*
Available online : *Mar. 19, 2025*

Article ID: *2535*

JEL classification: *M10, M13*

Editor-in-Chef[1] or Adjunct[2]:
[1] Dr. Edmundo Inácio Júnior
Univ. Estadual de Campinas, UNICAMP

Associate Editor:
Dr. Victor Silva Corrêa
Universidade Paulista, UNIP

Executive[1] or Assistant[2] Editor:
[2] M. Eng. Patrícia Trindade de Araújo

How to cite:
Costa, R. M., Nelson , R. E., & Pedroso, M. C. (2025). Business model development in startups: A study of causation, effectuation and bricolage. *REGEPE Entrepreneurship and Small Business Journal*, 14, e2535. https://doi.org/10.14211/regepe.esbj.e2535

Article verify by: Crossref Similarity Check

Corresponding author
Renato Machado Costa
rmcosta@alumni.usp.br

Abstract

Objective: Our main goal is to investigate how causation, effectuation and bricolage interact with business model's components across startup´s lifecycle, creating dynamics not foreseen in traditional linear approaches to business planning. **Methodology:** We applied Langley's alternative templates approach to compare the incidence of these logics in a biotech venture from ideation to scale up. **Main results**: The more static, limited nature of bricolage at startup's founding seems to have locked in the initial value proposition, which has not changed over time. By contrast the elements of effectuation that were used gave the startup considerable flexibility in areas such as production and distribution, which permitted rapid growth. Elements of causation were found throughout the trajectory to stabilize and bring efficiency to operation. **Theoretical contribution:** The use of the three logics impacted different components of the business model in different ways at different times but together generated synergies, enabling it to simultaneously address the contradictory and paradoxical forces of the regulatory environment, the difficulty of developing viable products and adapting to the dynamic requirements of scaling production, marketing and distribution, for geographically and socially diverse clients. **Relevance**: Our study responds to McKelvie's call for more empirical studies exploring the use of these approaches in venture development while providing a rich description of the development of a progressive startup in the Brazilian biotech sector. **Management contribution:** The main managerial contribution is helping entrepreneurs to better understand how to use business modeling concepts and techniques in their startup development, considering these alternative rationalities.

Keywords: Business Models; Effectuation; Bricolage; Causation.

Desenvolvimento de modelos de negócios em *startups*: Um estudo sobre causalidade, *effectuation* e bricolagem

Resumo

Objetivo: Investigar como causalidade, *effectuation* e bricolagem interagem com os componentes do modelo de negócio no ciclo de vida da *startup*, criando dinâmicas não previstas em abordagens lineares tradicionais para o planejamento de negócios. **Metodologia:** Aplicamos a abordagem de *templates* alternativos de *Langley* para comparar a incidência dessas lógicas em um empreendimento de biotecnologia, da ideação à expansão. **Principais resultados**: A natureza mais estática e limitada da bricolagem na fundação da *startup* parece ter bloqueado a proposta de valor inicial, que não mudou ao longo do tempo. Em contraste, os elementos de *effectuation* utilizados deram à *startup* flexibilidade em áreas como produção e distribuição, permitindo um rápido crescimento. Elementos de *causation* foram encontrados durante a trajetória para estabilizar e trazer eficiência à operação. **Contribuição teórica:** O uso das três lógicas impactou diferentes componentes do modelo de negócios de diferentes maneiras em diferentes momentos, mas juntos geraram sinergias, permitindo endereçar simultaneamente as forças contraditórias e paradoxais do ambiente regulatório, a dificuldade de desenvolver produtos viáveis e se adaptar aos requisitos dinâmicos de escala de produção, marketing e distribuição, para clientes geográfica e socialmente diversos. **Relevância**: Atendemos ao chamado de McKelvie por mais estudos empíricos explorando o uso dessas abordagens no desenvolvimento de empreendimentos, com uma descrição rica da evolução de uma *startup* no setor de biotecnologia brasileiro. **Contribuição em gestão:** A principal contribuição é ajudar os empreendedores a compreenderem melhor como usar conceitos e técnicas de modelagem de negócios no desenvolvimento de suas *startups*, considerando essas racionalidades alternativas.

Palavras-chave: Modelos de Negócios; *Effectuation*; Bricolagem; Causalidade.

INTRODUCTION

Entrepreneurs and entrepreneurship studies have a somewhat schizophrenic relationship with formal rationality. On one hand, like the classic leadership studies which identified "great men" leaders who seemed to possess almost magical visionary qualities and superhuman abilities (Sant'Anna et al., 2011), entrepreneurs are seen even in the sterile economic literature (Kirzner, 1973; Schumpeter, 1934) as having intuitive abilities that transcend ordinary logical faculties (Baldacchino et al., 2015; Fisher & Neubert, 2023; Fleckenstein & Smith, 2023; Sadler-Smith, 2016). On the other hand, we see substantial influence of formal business planning both in collegiate business curricula and in the millions of dollars awarded annually to the winners of business plan/model competitions, with rising interest from researchers (Dana et al., 2023). This evidence a fixation of the field on standardized expressions of logic that fit into cartesian formats, found in the early days of the ancient school of scientific management.

Up until the end of the last century, the emphasis on formal logic (nowadays called causation) seemed predominant. Herbert Simon´s book Administrative Behavior published in 1947 (and honored with the Nobel prize in 1978) already called into question managers´ abilities to obtain and process enough accurate information to reliably generate "optimal" decisions. However, only in the early 2000s did entrepreneurship studies began to seriously examine how entrepreneurs behave when subject to high levels of uncertainty and limited information processing abilities. Only in 2001 did Saras Sarasvathy (who not coincidentally wrote her Ph.D. thesis under Simon´s guidance) published her famous AMR paper on effectuation (Sarasvathy, 2001). A little later Baker and Nelson´s (2005) influential ASQ paper on entrepreneurial bricolage made many of the same points as Sarasvathy albeit from a more anthropological perspective.

Since then, work on alternative rationalities has expanded (e.g. Alzamora-Ruiz et al., 2021; Fisher, 2012; Futterer et al., 2018; Karami et al., 2022; Lecuna, 2021; Nelson & Read, 2024; Pöschl, 2022; Reymen et al., 2017; Ruiz-Jiménez et al., 2020; Servantie & Rispal, 2018; Yoon & Cho, 2021) but there is still a major gap in knowledge about these approaches pointed out by McKelvie et al. (2020), in understanding how their use changes over the venture development and business design process. Our research responds to this call for more empirical studies in this direction.

In this paper we attempt to bring thinking on bricolage and effectuation to bear on formal business planning, by illustrating how the experience of a unique Brazilian biotech startup suggests enhancements to the business model development techniques, built into the prominent planning template Business Model Canvas (Osterwalder & Pigneur, 2010). To this end we pose the following research question: How are causation, effectuation and bricolage used over time in the design and development of a startup's business model?

THEORETICAL FRAMEWORK

Business models and alternative rationalities

The concept of a "business model" (BM) as an integrative metaphor has existed in one way or another for some time, emerging especially from Porter´s (1985) value chains juxtaposed with variations of Drucker's (1966) adage that businesses exist to create a customer – both associated with classic linear industrial economic thought. The most popular and currently most used work on BM emerged during the early 21st century, when the internet generated enormous opportunities and pressures for firms to quickly establish and evolve an identity. Although in theory business modelling is flexible and open to emergent forces, its roots in Porter, Drucker and other classic perspectives predispose it to the static a priori features of causation. This tendency has been exacerbated by the enormous growth of pitch competitions and angel investors which are predicated on a compact, one-shot presentation presumed to be able to reduce the essence of a business to a "model" or formula.

The development of BMs has aroused the interest of both researchers and practitioners (Schneider & Spieth, 2013; Spieth et al., 2014; Zott et al., 2011) and is considered crucial for new ventures that need to create, deliver and capture value via new technologies (Chesbrough & Rosenbloom, 2002; Massa & Tucci, 2014; Teece, 2010). Indeed, some consider BMs a major source of competitive advantage (Amit & Zott, 2012; Demil et al., 2015). However, entrepreneurs often have trouble in defining a viable BM on the first attempt, due to high levels of technological and market uncertainty (Andries et al., 2013; Andries & Debackere, 2007), as well as the unpredictability of commercialization options (Chesbrough & Rosenbloom, 2002).

Particularly during early stages, the knowledge and resources available to deal with all these uncertainties are limited (Bhidé, 2000) so the components of the BM need to be created and revised at different times during the process (Dmitriev et al., 2014). For this reason, developing a BM is a dynamic process, involving numerous decisions under uncertainty (Sosna et al., 2010).

Business model representations contain different components which show how the company creates, delivers and captures value (e.g. Demil & Lecocq, 2010; Gassmann et al., 2014; Osterwalder & Pigneur, 2010; Pedroso, 2016). The most widespread approach, known as Business Model Canvas (BMC), represents BMs with nine components divided along four dimensions: (i) Value Propositions, (ii) Value Creation (key partnerships, activities and resources); (iii) Value Delivery (customer segments, channels, customer relationships); and (iv) Value Capture (revenue streams and cost structure) (Osterwalder & Pigneur, 2010). In our results we relate attributes of these nine components to the use of causation, effectuation, and bricolage in our case study, to demonstrate the implications of alternative rationalities for the longitudinal development of business models.

Causation, effectuation and bricolage

From a traditional economic perspective, the entrepreneur's rational decision-making process, known as causation, is based on the principles of recognizing, evaluating and deliberately exploiting an opportunity when demand outstrips supply (Casson, 2003; Shane & Venkataraman, 2000). On the other hand, alternative theoretical perspectives suggest that, under certain conditions, entrepreneurs take different paths to identify and exploit opportunities. A growing number of empirical studies focus on adaptive and transformative approaches, such as effectuation (e.g. Alzamora-Ruiz et al., 2021; Maine et al., 2015; Peng et al., 2020; Ruiz-Jiménez et al., 2020; Yoon & Cho, 2021) and bricolage (e.g. An et al., 2020; Lecuna, 2021; Nelson & Lima, 2020; Nelson & Read, 2024) which seem to be better suited to decision-making under uncertainty.

From our perspective which focuses on formal representations of BMs like those used in business plans and strategic plans, an important difference between causation and effectuation is the a priori logic and probabilistic predictions involved in causation (Weick, 1995). Under causation, the entrepreneur affirms that s/he can specifically and accurately identify the existence of a precise target market, value proposition and other important components of the business model, and generate a priori predictions about product adoption, sales, budgets, and profit margins before making substantial investments. Once these predictions are made and expressed in probabilistic terms, the entrepreneur will secure necessary funding with the expectation that the predicted results will be attained (Reymen et al., 2017). This affirmation normally comes with an assumption of risk-financial and otherwise. If the predicted results do not materialize large losses will likely follow.

Put differently, instead of making specific predictions and assuming the risk that the desired ends will be achieved, the effectuator will take an inventory of her available means (expressed

in terms of who I know, what I know, who I am, and so on) and ask what specific experimental actions can be taken within the limits of available means. In addition, instead of betting on the preexistence of a given market or environmental conditions, the effectuator asks if there is anything s/he can do to create or influence markets or environments. Finally, the effectuator determines a maximum affordable loss. That is to say, the effectuator does not ask how much must be invested to generate a given result, but how much s/he is willing to bet and lose, trying to generate given effects identified by her informal assessment of available means (Nelson & Lima, 2020; Sarasvathy, 2008). Thus, causation is seen as antagonistic to effectuation (Sarasvathy, 2001) and, by extension, also to bricolage (Mair & Martí, 2006).

Different from effectuation, which was developed by a small cadre of scholars attached to Saras Sarasvathy in the early 2000s, bricolage was first suggested by the anthropologist Levi Strauss in the 1950s and has slowly percolated throughout the social sciences without centralized sponsorship, leaving the concept much more elastic. Lévi-Strauss (1966) original definition was "making do with what is at hand" and has been operationalized differently in different disciplines like law, linguistics, and art. In entrepreneurship studies Baker and Nelson´s (2005) extension of the definition to include the recombination of existing elements to create workable solutions to new problems is widely accepted but the definition of a "new problem" is also elastic, encompassing problems that are new only to a certain group or partner. In practice, while the bricoleur takes and inventory of her "trove" of available resources s/he is much more limited than the effectuator in attempting to create new environments or forge new alliances. S/he is also much more focused on the resources and partnerships that are close by and require minimal acquisition of new inputs, making bricolage more concrete, limited, and better suited to penurious environments in which affordable losses are small. As a result, bricolage tends to be more limited in scope and generates finite solution sets that do not evolve radically over time.

In contemporary scholarship effectuation and bricolage attract considerable attention. These heuristics represent different approaches to decision-making (Ucbasaran, 2008) and have been examined in both new venture (Fisher, 2012) and larger organizational settings (Brettel et al., 2012).

Fisher reviewed entrepreneurship literature to identify the individual observable actions / behaviors that underlie each of these approaches and summarized them in a table (Fisher, 2012, p. 1030). With part of this table, he developed a platform to measure entrepreneurial behaviors related to bricolage, effectuation, and/or causation, which he applied in the analysis of case studies. This platform was further used by other researchers (e.g. Lecuna, 2021; Servantie & Rispal, 2018).

In addition to these broad attributes found in most research on effectuation and bricolage, recent work by Nelson and Read (2024) argues that a major difference between bricolage and effectuation is the comparatively closed, concrete, and finite nature of bricolage versus the more open and flexible nature of effectuation. Hence, effectuators start with basic questions about networks, knowledge and identity, but are open to new and tenuous partnerships, unforeseen changes in product use, acquisition and production, end users, and so on. Conversely bricoleurs typically have fewer trading partners with a longer history, stronger ties, cultures based on loyalty, and more cautious geographic and strategic expansion. Effectuation is thus more cyclical, flexible and ultimately scalable while bricolage uses only resources at hand in response to a specific need of members in a more bounded community. It is thus less risky but less flexible (Nelson & Read, 2024).

Consistent with Nelson and Read (2024) a meta-synthesis conducted by Scazziota et al. (2023) suggests that although the antecedents of effectuation and bricolage are equivalent, they affect entrepreneurs' actions differently. When they use effectuation, they are more likely to experiment with partners and the market, to reduce internal and external uncertainties when defining their objectives, and to gain legitimacy by exploiting their social and relationship capital. On the other hand, entrepreneurs operating in environments with scarce resources or great institutional complexity tend to act according to bricolage in pursuit of their objectives, with an emphasis on resource experimentation (Scazziota et al., 2023).

Relating causation, effectuation and bricolage to business models

Reymen et al. (2017) investigated the dynamics of the use of effectuation and causation in the development of BMs in new ventures and found that effectuation is predominantly used to generate a viable value proposition for a given customer segment via cycles of interaction with stakeholders. These interactions often lead to commitments from potential customers, thus reducing market uncertainty. In addition, prototypes are tested, reducing technological uncertainty.

This eventually increases the use of causal logic, which is believed to be predominantly used to develop the rest of the BM. The value proposition and customer segment are crystallized, and the other components of the BM are defined in relation to these, often in a detailed business plan (Reymen et al., 2017). However, when a shortage of resources arises, causal logic is once again replaced by increased decision-making based on effectuation. These authors emphasize that, before investing significant resources in a BM, it is crucial that the entrepreneur reduces technological and market uncertainties as much as possible, using effectuation, to avoid later costs with reconfiguration of the BM.

Chesbrough (2010) and some empirical studies (Andries et al., 2013; Chandler et al., 2011; Sitoh et al., 2014) highlight the importance of experimentation and effectuation for the development of BMs. However, it is not yet clear how the dynamics of diverse rationalities relate to the development of BMs or their specific components over time (Andries et al., 2013). Recent studies seek to understand the effects of causation and effectuation on the development of new business models (e.g. Baber et al., 2019; Brenk et al., 2019; Futterer et al., 2018; Ghezzi, 2019; Pöschl, 2022; Reymen et al., 2017; Xu et al., 2022). Some research evidence that "effectuation and causation are no substituting but rather synergetic entrepreneurial approaches within business model development, that are often applied simultaneously" (Anagnou et al., 2019), and which can be used in complex configurations (Harms et al., 2021).

Here we study a Brazilian biotech startup that experienced elements of causation, effectuation and, early on, bricolage. They made significant organizational, tactical, and strategic adjustments that may fit into the BMC, but also suggests improvements to make the Canvas more effective and realistic in uncertain environments.

METHODOLOGY

In this study we are following Fisher's (2012) guidance to provide a deep, rich analysis of entrepreneurial behaviors by focusing on a single case, using an alternate template methodology. Given our interest in relating alternative rationalities to business model development we needed some method of detecting the presence of effectuation and bricolage and then relating their dynamics to components of business models and tracking their coevolution across time. We used the questions proposed by McKelvie et al. (2020) to support the selection of the most appropriate methodology for this research.

To measure causation, bricolage and effectuation we conducted in depth ethnographic interviews with the founders of the startup, to capture process dynamics and broad dimensions of the general business model (see Appendix 1). The subject of our research was a biotechnology startup (in short, a biotech) in southwest Brazil which we studied retrospectively from pre-founding until deep into

scale up. We use the pseudonym Healthy Skin (HS) here. Around twenty startups were considered in the selection for this case study; the authors pre-selected three of them which were in scale up stage and suitable for conducting the research. Finally, HS was chosen, due to its singular and inspiring trajectory.

In addition to our general overview, we paid special attention to the trajectories and perceptions of the three founders. Our interviews were carried out between February 2023 and June 2024 and summed 270 minutes of recordings and around 90 pages of transcriptions, in addition to analyses of voluminous public information. The founders also shared with us detailed longitudinal data about distribution, financing, production, marketing, legal and regulatory matters.

In the interview script we used the established method of Fisher (2012) and Lecuna (2021) to assess the comparative presence of causation, effectuation and bricolage (see Appendix 1). We followed Langley´s (1999) alternative templates approach to create a structured comparison of the incidence of bricolage and effectuation, following Fisher´s specific research strategy – see also Allison (1969, 1971), for the pioneering studies, and similar entrepreneurship studies (e.g. Gancarczyk et al., 2020; Lecuna, 2021; Nelson & Lima, 2020; Ortega et al., 2017). We use Fisher's analytical platform in our Results section (Tables 1, 2 and 3), with the addition of items 1.1, 2.5 and 2.8 to enhance our case's analysis, also extracted from Table 2 in Fisher (2012, p. 1030).

Two of the authors then independently studied the transcribed interviews longitudinally to establish a common understanding of the incidence of causation, bricolage and effectuation and the coevolution of the business model through time. The comparative incidence of the two constructs is displayed in Tables 1, 2 and 3. This interpretation is presented in some detail in the Results and Discussion sections, where a wrap up is presented in Table 4.

DEVELOPMENT OF THE STARTUP

Healthy Skin (HS) was founded in 2016 by two Brazilian entrepreneurs with prior experience in large pharmaceutical companies. A few months later a third cofounder joined, bringing experience from a major cosmetics firm. The defining motivation came when the idealizing founder realized that a large number of cancer patients often interrupted chemo or radiotherapy due to severe skin problems, a frequent adverse reaction to these treatments. Because there were no effective solutions to this problem available in the market, she tried to develop a product in her current employer, but the idea didn't take off.

Since its inception, the startup has worked in health care, developing products to care for the skin and oral mucosa of cancer patients undergoing chemo and/or radiotherapy, so that they don't suffer from the wounds and burns caused by these treatments and don't have to interrupt them or reduce their dosage. The products include natural ingredients derived from biotechnology and biodiversity, with healing, anti-inflammatory and protective properties. They are free of skin-damaging ingredients and have been clinically proven to be effective and safe.

In the first few years, HS grew with resources from the three co-founders. Subsequently, they secured funding via public investment through PIPE Fapesp program. Later they established a partnership with Eretz.bio. These initiatives leveraged product development and company growth. In 2019, they raised venture capital from six angel investors and created a Board of Directors.

To develop their products, they thoroughly studied the biological origins of the problem, which has an inflammatory root, related to the weakening of the patient's immunosuppression. They searched for solutions supported by an outsourced development team and continued to prepare the formulas based on research and scientific publications. They developed prototypes and evaluation processes with potential users, observing how the product (for topical use) could mitigate the effects of cancer treatments on patients' skin. Prototypes were refined with feedback from patients in clinical studies, until final formulation.

Their products are currently listed as a reference in the Brazilian Clinical Oncology Manual and cited in the Oncological Guidelines, with indication for skin care. In addition, their products are adopted by important Brazilian cancer treatment centers, such as Einstein, HCor, BP, Rede D'Or, IBCC, Iamspe, among others. Until now the firm has not sought formal recognition of their products as medicines, preferring the less bureaucratic regulatory status of a Class 2 cosmetic.

RESULTS

Elements of causation, bricolage and effectuation at the core of the start up

Looking at the bare description of our case, it appears to exhibit some elements of causation, some of effectuation with perhaps some indication of bricolage. However, when we drill down into the actual narrative of the founders, we find important caveats. When we replicated Fisher´s (2012) method for our study, we found elements of the three rationalities (see Tables 1, 2 and 3), suggesting that the founders early and deep exposure to "corporate business" thinking did not predispose them to favor causation at the expense of effectuation or perhaps even bricolage. This reinforces the idea that especially effectuation is not inherently at variance with prominent current business model procedures. However, when we considered the process or longitudinal dynamics of our case, a more nuanced and interesting picture emerged, as we will explain in the Discussion section.

Table 1

Causation approach to entrepreneurship

1	Causation	FIT
1.1	Identifies an opportunity before developing anything	✓✓
1.2	Identified and assessed long-run opportunities in developing the firm	×
1.3	Calculated the returns of various opportunities	×
1.4	Wrote a business plan	×
1.5	Organized and implemented control processes	✓
1.6	Gathered and reviewed information about market size and growth	×
1.7	Gathered information about competitors and compared their offerings	✓
1.8	Wrote up or verbally expressed a vision for venture	✓✓
1.9	Developed a project plan to develop the product and/or services	✓✓
1.10	Wrote up a marketing plan for taking the products/services to market	×

Note: Adapted by the authors from Fisher (2012).
Alignment/fit between case study data and behavior in each theory: ✓✓ Strong fit. ✓ Evidence not so strong. × Behavior not aligned.

Table 2

Effectual approach to entrepreneurship

2	Effectuation	FIT
	Experimentation	
2.1	Developed multiple variations of a product or service in arriving at a commercial offering	✓✓
2.2	Experimented with different ways to sell and/or deliver the product or service in arriving at a commercial offering	✓✓
2.3	Changed the product or service substantially as the venture developed	✓
	Affordable loss	
2.4	Commits only limited amounts of resources to the venture at a time	✓✓
2.5	Limited the resources committed to the venture into what could be lost	✓✓
	Flexibility	
2.6	Responded to unplanned opportunities as they arose	✓✓
2.7	Adapted what they were doing to the resources on hand	✓✓
2.8	Avoided courses of action that restrict flexibility and adaptability	✓✓
	Precommitments	
2.9	Entered into agreements with customers, suppliers, and other organizations	✓✓

Note: Adapted by the authors from Fisher (2012).
Alignment/fit between case study data and behavior in each theory:
✓✓ Strong fit. ✓ Evidence not so strong. × Behavior not aligned.

Table 3

Bricolage approach to entrepreneurship

3	Bricolage	FIT
	Bricolage definition	
3.1	Making do - Took action to solve problems (rather than questioning whether a workable solution could be found)	✓✓
3.2	Combination of resources for new purposes - Combined existing resources in creating solutions	×
3.3	Combination of resources for new purposes - Reused resources for purposes other than those for which they were originally designed	×
3.4	The resources at hand - Used existing resources (rather than seeking resources from outside)	✓
	Bricolage domains	
3.5	Physical inputs - used forgotten, discarded, worn, or presumed "single-application" materials to create new solutions	×
3.6	Labor inputs - involved customers, suppliers, and hangers-on in providing work on projects	✓✓
3.7	Skills inputs - encouraged the use of amateur and self-taught skills that would otherwise go unapplied	×
3.8	Institutional/regulatory environment - rejected the limitations of the environment. Worked around rules and standards	✓✓

Note: Adapted by the authors from Fisher (2012).
Alignment/fit between case study data and behavior in each theory:
✓✓ Strong fit. ✓ Evidence not so strong. × Behavior not aligned.

DISCUSSION

The birth of the venture displayed several elements of bricolage, particularly vis a vis the personal trajectories of the founders (Baker & Nelson, 2005). All three had nurtured strong personal relations with one another over the course of their careers. Founder-3 observes this about Founder-1: "My father was under cancer treatment when we first met. I did some consulting jobs for them, and we became friends. She tried to present this project in the pharmaceutical industry, but they didn't embrace it. Some years later, she left to found HS and asked me to apply the same conversational practices in the startup. I did that as pro-bono and soon I was joining HS". In addition, the initial impetus for the firm´s major product was personal and concrete in that close friends and relatives had cancer and suffered severe skin problems because of treatment's adverse effects. This misfortune provoked a search for readily producible palliative skin care, within the immediate professional experience of the founders.

If we see bricolage as arising from the recombination of elements at hand, that have been set aside in dedicated troves, then the close collaboration between the founders, each contributing from her store of professional experience, is indicative of bricolage elements at founding (Mair & Martí, 2006). Founder-1 worked for fourteen years in the new products area of a large Brazilian pharmaceutical industry that produced topical medicines. When her experience with relatives and friends provoked her to think in terms of relief for patients undergoing radio or chemotherapy, she went first to her employer with an informal proposal for a new product. The company rejected her idea without even sponsoring a business plan for the product, she continued working on the idea, ignoring the rejection and enlisting voluntary involvement of the current cofounders until they came on as equity partners. Again, rejecting the limitations, typical of a bricoleur.

Founder-2 worked in R&D of new products for eight years at the same company as Founder-1, and then five years in another Brazilian large pharmaceutical company, while Founder-3 worked for ten years in a premier Brazilian natural cosmetics firm, dealing intimately with native and sustainable herbal compounds. Founder-1 said: "I was glad Founder-2 joined me in this venture, because she has know-how about the processes, and relationship with manufacturers we can partner with". Eventually the three founders combined knowledge of the formal medicament industry with the natural cosmetics business to generate their major products. A clearer example of recombining the elements of the personal troves of closely knit trading partners as part of the bricolage process would be hard to find, aligned to Nelson and Lima (2020).

In addition to rejecting her firm´s refusal to develop the proposed project, the founder also chose to deviate from the normal process of medicament development by having her topical formula approved by ANVISA as a Class 2 cosmetic, instead of a medicine, yet at the same time undertaking clinical research and publishing scientific articles about on the product´s efficacy – and rejecting ordinary therapeutic product development practice to access the market quickly and cheaply. Founder-2 said that "we decided to firstly develop a Class 2 cosmetic, to differentiate it from other products. In this case we also need to have clinical studies, but it is simpler than what is required for medicines. Nowadays we have in our R&D pipeline a medicine product". Again, we see a sophisticated example of bricolage – making do with what is at hand, rejecting limitations, and blurring disciplinary boundaries (Baker & Nelson, 2005; Nelson & Lima, 2020).

Quickly iterating elements of effectuation appear later in components of the business model

We see in the section above that bricolage appears among the founders of the firm incident to its beginnings, but it seems to leave a lasting imprint in the relations between founders and the basic nature of the product and how it is positioned via the regulators. The subsequent development of this venture appears to be much more dynamic and mutable, visibly aligned to many elements of effectuation with few if any indications of further bricolage and some causation. It is also much easier to fit into the categories of the business model, albeit with frequent transitions from one form of value creation, delivery, capture, and so on to another. This is aligned to the findings of Anagnou et al. (2019) that the approaches can be applied simultaneously.

To finance the startup, firstly the founders bootstrapping, followed by a loan in a development bank. They started small, putting resources limited to what could be lost by them, in a clear effectual approach. They had soon partnered with hospitals to be in contact with doctors, nurses and patients, to learn more about skin problems, and to be able to test their prototypes. To develop

the products, they researched scientific studies about medicines and formulas used in skin diseases like the adverse reactions of radio and chemotherapy. Then they reduced the components that could damage the patients' skin, which was already fragile, in new combinations. They showed these prototypes to the patients to see their acceptance to use it (smell, consistence etc.). After getting a good prototype, they started to test it, gathering more feedback. They quickly iterated in these cycles until reaching a good quality, in terms of safety and effectiveness. Also, they soon got partnership with other hospitals, to have the products recommended to more patients, increasing the coverage and taking the opportunities, again in an effectual manner (Sarasvathy, 2008; Sarasvathy & Venkataraman, 2011).

HS was structured to develop and market the products, but almost since the beginning, manufacturing has been outsourced to a specialized supplier with the flexibility to operate with batches of different sizes, allowing production to be scaled up on the same site. For the time being, there are no plans to invest in their own factory. Founder 2 said: "It is hard for a startup to invest in all equipment to produce with the quality and flexibility we needed. I had previous knowledge of processes and the main players, so we found a partner which can do that for us in small quantities, and further support us when we scale. We are with them until now". This is another example of effectuation, favoring flexibility and precommitments, and limiting the investments (Fisher, 2012).

They recognize that the products could be applied to other dermatological diseases, but they believe that the investments to achieve these new markets would be too high for now – for example, discussing skin diseases with dermatologists (around 12,000 in Brazil) requires a much greater reach than talking to oncologists (around 3,000). In addition, the treatment of cancer patients is much more concentrated in specialized clinics and hospitals than it is for dermatologic patients. Founder-1 said: "One of our angels was successful treating some patients with skin manifestations of gastrointestinal diseases with our products, and she suggested we enter this other market. However, for us the investments in distribution would be too high at this moment". This is aligned with the construct Effectual Control Orientation (Harms et al., 2021) which means "controlling and shaping influence on an external environment in a co-creative manner".

To benefit from this, a recent strategy of HS is to license their products to pharmaceutical companies as a second brand or white label, with the aim of serving patients with other skin diseases such as psoriasis (studies in progress). By doing so, their innovations can reach patients through the sales and distribution force of these pharmaceutical companies, and HS can be paid through royalties. Again, they are moving in an effectual way, responding rapidly to the opportunities as they arrive, corroborating the findings of Karami et al. (2022).

The company's main competitive advantage is the partners' in-depth knowledge of customers, the problem they face, and the solution (value proposition) offered by HS. Above all, their product is still unique in its category, with safety and efficacy proven in clinical studies already published. Also, the fact that the startup is incubated in the ecosystem of Hospital Albert Einstein, is a major competitive advantage over new players. This partnership is important in their strategy, illustrating effectuation with precommitments, like reinforced by Nelson & Read (2024) in their study.

Their decision-making processes are based on experimentation and validation with users and the teams, listening to people and, whenever possible, making decisions together. Since the entry of angel investors and the creation of a board, regular meetings have been held to present reports and to discuss plans and needs. Thus, there is a decision-making process that listens to different stakeholders. We see here some causation's behaviors, when they try to organize and implement control processes.

HS began its sales through e-commerce, the fastest way to test product acceptance, then adopted telesales and WhatsApp channels, especially since the Covid-19 pandemic. An important part of their marketing strategy is to directly contact oncologists, radiologists and nursing staff to show how the products work, seeking referrals to patients and raising awareness. The company innovated its business model, seeking other channels. Besides its B2C strategy, it started B2B sales to pharmacies, hospitals, and pharmaceutical companies – which buy the products to donate to their customers. As of May 2024, HS had already treated more than 50,000 patients with its products and visited an average of 1,000 doctors and nurses every month. They estimate that HS attends only 2% of the potential market in Brazil with their products, so there is a huge market opportunity to exploit. Once more effectuation is present, we see their flexibility in responding to new opportunities of sales channels.

The findings of our study are summarized in Table 4.

Business model canvas in motion: The key components across the evolution of a biotech startup

We have established fairly clearly the trajectory of causation, effectuation, and bricolage across the evolution of this startup; however, the greater task remains of teasing out the implications of these results for the business model development process, which emerged from a rather static mindset and would benefit from an understanding of the relationship between alternative rationalities and the components that traditionally compose BMs. This task will require additional research and more space than we have here. However, to start the process we propose the following list of components of the Osterwalder's model as they relate to the entrepreneurial journey of HS, highlighting the presence of different rationalities across time and components of BM.

Value Proposition surfaced early on, in response to the needs of a close family member of a founder. The close at hand relationship that provoked the value proposition has elements of bricolage but even when scaled, the basic value proposition did not seem to change.

Table 4

Causation, effectuation and bricolage manifestations in business model design over time

Dimension	Component	Until Foundation			Early years			Angel investors			Incubation			Recent years		
		C	E	B	C	E	B	C	E	B	C	E	B	C	E	B
Value	Value Propositions	×	×	✓✓	✓	✓✓	✓	✓	✓✓	✓	✓	✓✓	×	✓	✓✓	×
Value Creation	Key Resources	×	×	✓✓	×	✓✓	✓	×	✓✓	✓	✓	✓✓	×	✓	✓✓	×
	Key Activities	×	×	✓✓	×	✓✓	✓	✓✓	✓✓	×	✓	✓✓	×	✓✓	✓✓	×
	Key Partnerships	×	×	✓✓	×	✓✓	✓	✓	✓✓	×	✓✓	✓✓	×	✓✓	✓✓	×
Value Delivery	Customer Segment	×	×	✓	✓	✓✓	×	✓	✓	×	✓	✓✓	×	✓	✓✓	×
	Channels	×	×	×	×	✓✓	×	✓	✓✓	×	✓	✓✓	×	✓✓	✓✓	×
	Customer Relationships	×	×	✓	×	✓✓	×	×	✓✓	×	✓	✓✓	×	✓	✓✓	×
Value Capture	Revenue Streams	×	×	×	×	✓	×	×	✓	×	✓	✓	×	✓	✓	×
	Cost Structure	×	×	×	×	✓✓	×	×	✓✓	×	✓	✓✓	×	✓	✓✓	×

Note: Elaborated by the authors.

Key Partnerships were the second temporal phase of the development of the startup and again relied on close relationships suggesting again elements of bricolage. Subsequent partnerships tended to be effectual, with some causation with increased scale.

Customer Relationships were fluid and coevolved with Distribution Channels. In the initial phase friends and acquaintances of the founders were used in a more effectual fashion. These relationships, however, evolved into more impersonal contacts with the medical community, professional organizations, pharmacies, and distributors, evolving toward formal sales representatives and advertising budgets using a causation logic.

Key Activities evolved haphazardly, starting with laboratory and craft production, which was soon outsourced, then moving to formal approval of products such as cosmetics without therapeutic proofs, to clinical testing and professional publications to generate legitimacy in the medical community, to the choice of new products based on the results of the former phases. These initial activities were mostly effectual, but the nature of the partnerships used varied considerably and despite the ultimate tendency toward causation, there was considerable volatility, suggesting that in this case, early attempts at planning and identifying key activities would likely have led the founders astray.

Cost Structure varied considerably, also moving from low volume high margin products to a predictable cost structure under outsources, to benefits of state research funding justified through formal bureaucratic applications. The decision to seek approval as a medicament is yet uncertain and involves high uncertainties.

CONCLUSION AND LIMITATIONS

The variance found across the major components of the BM canvas when juxtaposed with bricolage, effectuation, and causation illustrates the importance of taking an evolutionary perspective that nonetheless does not raise the expectation that the different dimensions of the canvas will arise and develop simultaneously.

Summary proposition: What is at hand at founding becomes who you are

In attempting to add conceptual value based on our case study we seek to relate three diverse concepts from the different theoretical resources used in this paper: “value proposition” from business models, “at hand” from bricolage, and “who am I” from effectuation. Our close reading of the field notes reveals that the founders acted on their direct experience “at hand”, the suffering of relatives and colleagues in response to aggressive medication, to develop palliative natural compounds, which were in turn tried out over time on a variety of patients “at hand” via personal contacts with health care professionals. We would like to suggest that this direct experience “at hand” over time imprinted a personal and organizational identity (“who am I” in Sarasvathy´s terms) that persisted over time and anchors the value proposition of the firm since these days. We suggest that the constant exposure of certain elements “at hand” eventually becomes linked to “identity” which has durable impact (see Hatch & Schultz, 1997, 2002 for representative work on identity). In other words, combining effectual and bricolage perspectives, things that are “at hand” long enough become “who we are” and take on a durable life of their own, which is both beneficial in creating a stable organizational identity and culture but may also lock the venture, and particularly the “value proposition”, into a static trajectory that will be hard to change. Thus, we envision a sequence, frequent close contact experience (especially when it has strong emotional contact) which imprints certain values, if not value propositions, enhancing but constraining the subsequent development of the venture. Obviously only future research can reveal the degree to which this causal sequence is a common one, but we believe that this possibility is worth pursuing and hold this observation to be the central takeaway from this research.

Limitations and future studies:

The processes for creating and innovating business models must consider that the starting point and the initial components of the BM to be developed will depend on the rationality used by the entrepreneurs and the context of the venture. In the case studied here, in the phase prior to the foundation, the bricolage approach was central, focusing on the components value proposition, value creation and customer segments. Subsequently, there was a predominance of effectuation, complemented by the other approaches, bricolage and causation. In the final stages (incubation and recent years), the bricolage approach was little adopted.

Thus, we can consider at least three insights from the case study: (i) the approaches are complementary, and their emphasis may vary throughout the evolution of the BM; (ii) from a certain point on, one of the approaches was preponderant (in our case, effectuation); (iii) the bricolage approach was predominant in the beginning, but little adopted in the final stages of the case study. Thus, we can infer the following propositions, to be studied in subsequent research:

- Bricolage, effectuation and causation approaches can be adopted in a complementary manner in the evolution of a venture's business model;

- From a certain point on, one of the approaches tends to be dominant. This may reflect an adaptive and learning process by the entrepreneurs.

This research is based on a single case study. However, the chosen case is very peculiar, and we were able to study it in depth. An opportunity for further investigation is to add other cases, allowing it to contrast the results for startups in similar (if possible) or different contexts. The case study did not consider the maturity point of the BM, known as “business model fit”. Future studies could incorporate this empirical construct into the theoretical basis and analysis of the case. The entrepreneurs had high corporate experience and low entrepreneurial experience at the beginning of the venture. The entrepreneurs’ previous experience was not considered. Future studies could also incorporate this construct into theoretical basis and analysis.

Conflict of interest statement

The authors declare that there is no conflict of interest.

Authors’ statement of individual contributions

Roles	Contributions		
	Costa R. M.	Nelson R. E.	Pedroso M. C.
Conceptualization	■		
Methodology	■		
Software		N. A.	
Validation	■		
Formal analysis	■	■	■
Investigation	■		
Resources	■		
Data Curation	■		
Writing - Original Draf	■	■	■
Writing - Review & Editing	■	■	■
Visualization	■		
Supervision			■
Project administration	■		
Funding acquisition		N.A.	

Note: Acc. CRediT (Contributor Roles Taxonomy): https://credit.niso.org/

Open Science: Data availability

The dataset supporting the results of this study is not publicly available.

Badge	Description
	As informed to participants in the Informed Consent Form - ICF "13 - The right to confidentiality is guaranteed: the information obtained will be analysed jointly with other organizations, and the identification of any organization will not be disclosed without their prior explicit and formal consent;"
	Not applicable
	https://doi.org/10.48331/scielodata.3Z12TS
	https://doi.org/10.14211/regepe.esbj.e2535pr
	Not applicable

REFERENCES

Allison, G. T. (1969). Conceptual Models and the Cuban Missile Crisis. *American Political Science Review*, *63*(3), 689–718. https://doi.org/10.2307/1954423

Allison, G. T. (1971). *Essence of Decision: Explaining the Cuban Missile Crisis*. Little Brown.

Alzamora-Ruiz, J., del Mar Fuentes-Fuentes, M., & Martinez-Fiestas, M. (2021). Together or separately? Direct and synergistic effects of Effectuation and Causation on innovation in technology-based SMEs. *International Entrepreneurship and Management Journal*. https://doi.org/10.1007/s11365-021-00743-9

Amit, R., & Zott, C. (2012). Creating value through business model innovation. *MIT Sloan Management Review*, *53*(3), 41–49. http://sloanreview.mit.edu/article/creating-value-through-business-model-innovation/

An, W., Rüling, C.-C., Zheng, X., & Zhang, J. (2020). Configurations of effectuation, causation, and bricolage: implications for firm growth paths. *Small Business Economics*, *54*(3), 843–864. https://doi.org/10.1007/s11187-019-00155-8

Anagnou, M., Handrich, M., Schnellbächer, B., & Heidenreich, S. (2019). Two sides of the same coin - how the application of effectuation and causation shapes business model elements throughout the development stages of digital start-ups. *International Journal of Entrepreneurial Venturing*, *11*(4), 309. https://doi.org/10.1504/IJEV.2019.101630

Andries, P., & Debackere, K. (2007). Adaptation and Performance in New Businesses: Understanding the Moderating Effects of Independence and Industry. *Small Business Economics*, *29*(1–2), 81–99. https://doi.org/10.1007/s11187-005-5640-2

Andries, P., Debackere, K., & van Looy, B. (2013). Simultaneous Experimentation as a Learning Strategy: Business Model Development Under Uncertainty. *Strategic Entrepreneurship Journal*, *7*(4), 288–310. https://doi.org/10.1002/sej.1170

Baber, W. W., Ojala, A., & Martinez, R. (2019). Effectuation logic in digital business model transformation. *Journal of Small Business and Enterprise Development*, *26*(6/7), 811–830. https://doi.org/10.1108/JSBED-04-2019-0139

Baker, T., & Nelson, R. E. (2005). Creating Something from Nothing: Resource Construction through Entrepreneurial Bricolage. *Administrative Science Quarterly*, *50*(3), 329–366. https://doi.org/10.2189/asqu.2005.50.3.329

Baldacchino, L., Ucbasaran, D., Cabantous, L., & Lockett, A. (2015). Entrepreneurship Research on Intuition: A Critical Analysis and Research Agenda. *International Journal of Management Reviews*, *17*(2), 212–231. https://doi.org/10.1111/ijmr.12056

Bhidé, A. V. (2000). *The Origin and Evolution of New Businesses*. Oxford University Press.

Brenk, S., Lüttgens, D., Diener, K., & Piller, F. (2019). Learning from failures in business model innovation: solving decision-making logic conflicts through intrapreneurial effectuation. *Journal of Business Economics*, *89*(8–9), 1097–1147. https://doi.org/10.1007/s11573-019-00954-1

Brettel, M., Mauer, R., Engelen, A., & Küpper, D. (2012). Corporate effectuation: Entrepreneurial action and its impact on R&D project performance. *Journal of Business Venturing*, *27*(2), 167–184. https://doi.org/10.1016/j.jbusvent.2011.01.001

Casson, M. (2003). *The Entrepreneur* (2nd ed.). Edward Elgar Publishing. https://doi.org/10.4337/9781843765639

Chandler, G. N., DeTienne, D. R., McKelvie, A., & Mumford, T. V. (2011). Causation and effectuation processes: A validation study. *Journal of Business Venturing*, *26*(3), 375–390. https://doi.org/10.1016/j.jbusvent.2009.10.006

Chesbrough, H. W. (2010). Business Model Innovation: Opportunities and Barriers. *Long Range Planning*, *43*(2–3), 354–363. https://doi.org/10.1016/j.lrp.2009.07.010

Chesbrough, H. W., & Rosenbloom, R. S. (2002). The role of the business model in capturing value from innovation: evidence from Xerox Corporation's technology spin-off companies. *Industrial and Corporate Change*, *11*(3), 529–555. https://doi.org/10.1093/icc/11.3.529

Dana, L.-P., Crocco, E., Culasso, F., & Giacosa, E. (2023). Business plan competitions and nascent entrepreneurs: a systematic literature review and research agenda. *International Entrepreneurship and Management Journal*, *19*(2), 863–895. https://doi.org/10.1007/s11365-023-00838-5

Demil, B., & Lecocq, X. (2010). Business model evolution: In search of dynamic consistency. *Long Range Planning*, *43*(2–3), 227–246. https://doi.org/10.1016/j.lrp.2010.02.004

Demil, B., Lecocq, X., Ricart, J. E., & Zott, C. (2015). Introduction to the SEJ Special Issue on Business Models: Business Models within the Domain of Strategic Entrepreneurship. *Strategic Entrepreneurship Journal*, *9*(1), 1–11. https://doi.org/10.1002/sej.1194

Dmitriev, V., Simmons, G., Truong, Y., Palmer, M., & Schneckenberg, D. (2014). An exploration of business model development in the commercialization of technology innovations. *R&D Management*, *44*(3), 306–321. https://doi.org/10.1111/radm.12066

Drucker, P. F. (1966). *The Effective Executive: The Definitive Guide to Getting the Right Things Done*. Harper Business.

Fisher, G. (2012). Effectuation, Causation, and Bricolage: A Behavioral Comparison of Emerging Theories in Entrepreneurship Research. *Entrepreneurship Theory and Practice*, *36*(5), 1019–1051. https://doi.org/10.1111/j.1540-6520.2012.00537.x

Fisher, G., & Neubert, E. (2023). Evaluating Ventures Fast and Slow: Sensemaking, Intuition, and Deliberation in Entrepreneurial Resource Provision Decisions. *Entrepreneurship: Theory and Practice*, *47*(4), 1298–1326. https://doi.org/10.1177/10422587221093291

Fleckenstein, K., & Smith, R. (2023). Developing 'fresh perspectives' on 'entrepreneurial intuition.' *The International Journal of Entrepreneurship and Innovation*, 146575032311761. https://doi.org/10.1177/14657503231176136

Futterer, F., Schmidt, J., & Heidenreich, S. (2018). Effectuation or causation as the key to corporate venture success? Investigating effects of entrepreneurial behaviors on business model innovation and venture performance. *Long Range Planning*, *51*(1), 64–81. https://doi.org/10.1016/j.lrp.2017.06.008

Gancarczyk, M., Freiling, J., & Gancarczyk, J. (2020). The dynamics of SME growth processes and the role of enabling constraints: an evidence-based theoretical framework. *Journal of Organizational Change Management*, *34*(1), 180–205. https://doi.org/10.1108/JOCM-07-2020-0208

Gassmann, O., Frankenberger, K., & Csik, M. (2014). *The Business Model Navigator: 55 Models that Will Revolutionise Your Business*. Pearson Education.

Ghezzi, A. (2019). Digital startups and the adoption and implementation of Lean Startup Approaches: Effectuation, Bricolage and Opportunity Creation in practice. *Technological Forecasting and Social Change*, *146*, 945–960. https://doi.org/10.1016/j.techfore.2018.09.017

Harms, R., Alfert, C., Cheng, C.-F., & Kraus, S. (2021). Effectuation and causation configurations for business model innovation: Addressing COVID-19 in the gastronomy industry. *International Journal of Hospitality Management*, *95*, 102896. https://doi.org/10.1016/j.ijhm.2021.102896

Hatch, M. J., & Schultz, M. (1997). Relations between organizational culture, identity and image. *European Journal of Marketing*, *31*(5/6), 356–365. https://doi.org/10.1108/eb060636

Hatch, M. J., & Schultz, M. (2002). The Dynamics of Organizational Identity. *Human Relations*, *55*(8), 989–1018. https://doi.org/10.1177/0018726702055008181

Karami, M., Baber, W. W., & Ojala, A. (2022). The effectual process of business model innovation for seizing opportunities in frontier markets. *Technovation*, *117*, 102595. https://doi.org/10.1016/j.technovation.2022.102595

Kirzner, I. M. (1973). *Competition and Entrepreneurship*. University of Chicago Press.

Langley, A. (1999). Strategies for Theorizing from Process Data. *Academy of Management Review*, *24*(4), 691–710. https://doi.org/10.5465/amr.1999.2553248

Lecuna, A. (2021). Understanding Imagination in Entrepreneurship. *Entrepreneurship Research Journal*. https://doi.org/10.1515/erj-2021-0103

Lévi-Strauss, C. (1966). *The savage mind*. The University of Chicago Press.

Maine, E., Soh, P.-H., & Dos Santos, N. (2015). The role of entrepreneurial decision-making in opportunity creation and recognition. *Technovation*, *39–40*(1), 53–72. https://doi.org/10.1016/j.technovation.2014.02.007

Mair, J., & Martí, I. (2006). Social entrepreneurship research: A source of explanation, prediction, and delight. *Journal of World Business*, *41*(1), 36–44. https://doi.org/10.1016/j.jwb.2005.09.002

Massa, L., & Tucci, C. L. (2014). Business Model Innovation. In M. Dodgson, D. M. Gann, & N. Phillips (Eds.), *The Oxford Handbook of Innovation Management* (pp. 420–441). Oxford University Press. https://doi.org/10.1093/oxfordhb/9780199694945.013.002

McKelvie, A., Chandler, G. N., DeTienne, D. R., & Johansson, A. (2020). The measurement of effectuation: highlighting research tensions and opportunities for the future. *Small Business Economics*, *54*(3), 689–720. https://doi.org/10.1007/s11187-019-00149-6

Nelson, R. E., & Lima, E. (2020). Effectuations, social bricolage and causation in the response to a natural disaster. *Small Business Economics*, *54*(3), 721–750. https://doi.org/10.1007/s11187-019-00150-z

Nelson, R. E., & Read, S. (2024). Artifact concreteness as imprinter in the organization design process. *Journal of Business Venturing Design*, *3*, 100018. https://doi.org/10.1016/j.jbvd.2023.100018

Ortega, A. M., García, M. T., & Santos, M. V. (2017). Effectuation-causation: what happens in new product development? *Management Decision*, *55*(8), 1717–1735. https://doi.org/10.1108/MD-03-2016-0160

Osterwalder, A., & Pigneur, Y. (2010). *Business Model Generation: A Handbook For Visionaries, Game Changers, And Challengers*. John Wiley & Sons.

Pedroso, M. C. (2016). *Modelo de negócios e suas aplicações em administração (vol. 1)*. Tese de Livre Docência, Faculdade de Economia, Administração e Contabilidade, Universidade de São Paulo, São Paulo.

Peng, X. B., Liu, Y. L., Jiao, Q. Q., Feng, X. Bin, & Zheng, B. (2020). The nonlinear effect of effectuation and causation on new venture performance: The moderating effect of environmental uncertainty. *Journal of Business Research*, *117*, 112–123. https://doi.org/10.1016/j.jbusres.2020.05.048

Porter, M. E. (1985). *Competitive Advantage: Creating and Sustaining Superior Performance*. Free Press.

Pöschl, A. (2022). Entrepreneurial decision-making logics during time-critical pivoting: empirical evidence from high-tech ventures. *International Journal of Entrepreneurial Venturing*, *14*(1), 16. https://doi.org/10.1504/IJEV.2022.122016

Reymen, I., Berends, H., Oudehand, R., & Stultiëns, R. (2017). Decision making for business model development: a process study of effectuation and causation in new technology-based ventures. *R&D Management*, *47*(4), 595–606. https://doi.org/10.1111/radm.12249

Ruiz-Jiménez, J. M., Ruiz-Arroyo, M., & del Mar Fuentes-Fuentes, M. (2020). The impact of effectuation, causation, and resources on new venture performance: novice versus expert entrepreneurs. *Small Business Economics*. https://doi.org/10.1007/s11187-020-00371-7

Sadler-Smith, E. (2016). The role of intuition in entrepreneurship and business venturing decisions. *European Journal of Work and Organizational Psychology*, *25*(2), 212–225. https://doi.org/10.1080/1359432X.2015.1029046

Sant'Anna, A. de S., Lotfi, S., Nelson, R. E., Campos, M. S., & Leonel, J. N. (2011). A constructivist perspective on leadership thought among Brazilian and North-American scholars. *BAR - Brazilian Administration Review*, *8*(2). https://doi.org/10.1590/S1807-76922011000200006

Sarasvathy, S. D. (2001). Causation and Effectuation: Toward a Theoretical Shift from Economic Inevitability to Entrepreneurial Contingency. *Academy of Management Review*, *26*(2), 243–263. https://doi.org/10.5465/amr.2001.4378020

Sarasvathy, S. D. (2008). *Effectuation: Elements of entrepreneurial expertise*. Edward Elgar Publishing. https://doi.org/10.4337/9781848440197

Sarasvathy, S. D., & Venkataraman, S. (2011). Entrepreneurship as Method: Open Questions for an Entrepreneurial Future. *Entrepreneurship Theory and Practice*, *35*(1), 113–135. https://doi.org/10.1111/j.1540-6520.2010.00425.x

Scazziota, V., Serra, F., Sarkar, S., & Guerrazzi, L. (2023). The antecedents of entrepreneurial action: A meta-synthesis on effectuation and bricolage. *Journal of Business Research*, *155*(113411). https://doi.org/10.1016/j.jbusres.2022.113411

Schneider, S., & Spieth, P. (2013). Business model innovation: Towards an integrated future research agenda. *International Journal of Innovation Management*, *17*(01), 1–34. https://doi.org/10.1142/S136391961340001X

Schumpeter, J. A. (1934). *The Theory of Economic Development*. Harvard University Press.

Servantie, V., & Rispal, M. H. (2018). Bricolage, effectuation, and causation shifts over time in the context of social entrepreneurship. *Entrepreneurship & Regional Development*, *30*(3–4), 310–335. https://doi.org/10.1080/08985626.2017.1413774

Shane, S., & Venkataraman, S. (2000). The Promise of Entrepreneurship as a Field of Research. *Academy of Management Review*, *25*(1), 217–226. https://doi.org/10.5465/amr.2000.2791611

Simon, H. A. (1947). *Administrative Behavior: a Study of Decision-Making Processes in Administrative Organization*. Macmillan.

Sitoh, M. K., Pan, S. L., & Yu, C.-Y. (2014). Business models and tactics in new product creation: The interplay of effectuation and causation processes. *IEEE Transactions on Engineering Management*, *61*(2), 213–224. https://doi.org/10.1109/TEM.2013.2293731

Sosna, M., Trevinyo-Rodríguez, R. N., & Velamuri, S. R. (2010). Business Model Innovation through Trial-and-Error Learning: The Naturhouse Case. *Long Range Planning*, *43*(2–3), 383–407. https://doi.org/10.1016/j.lrp.2010.02.003

Spieth, P., Schneckenberg, D., & Ricart, J. E. (2014). Business model innovation - state of the art and future challenges for the field. *R&D Management*, *44*(3), 237–247. https://doi.org/10.1111/radm.12071

Teece, D. J. (2010). Business Models, Business Strategy and Innovation. *Long Range Planning*, *43*(2–3), 172–194. https://doi.org/10.1016/j.lrp.2009.07.003

Ucbasaran, D. (2008). The Fine 'Science' of Entrepreneurial Decision-Making. *Journal of Management Studies*, *45*(1), 221–237. https://doi.org/10.1111/j.1467-6486.2007.00751.x

Weick, K. E. (1995). *Sensemaking in organizations*. Sage.

Xu, S., He, J., Morrison, A. M., de Domenici, M., & Wang, Y. (2022). Entrepreneurial networks, effectuation and business model innovation of startups: The moderating role of environmental dynamism. *Creativity and Innovation Management*, *31*(3), 460–478. https://doi.org/10.1111/caim.12514

Yoon, J. H., & Cho, E. (2021). Effectuation (EF) and Causation (CS) on Venture Performance and Entrepreneurs' Dispositions Affecting the Reliance on EF and CS. *Entrepreneurship Research Journal*. https://doi.org/10.1515/erj-2020-0054

Zott, C., Amit, R., & Massa, L. (2011). The Business Model: Recent Developments and Future Research. *Journal of Management*, *37*(4), 1019–1042. https://doi.org/10.1177/0149206311406265

Appendix 1

Entrepreneur interview script

1	What was the context before the startup was founded? Discuss the context in relation to the entrepreneur, the technology and the market.
2	Where did the opportunity come from? Describe the process by which the opportunity arose.
3	How was the initial customer segment defined, and the problems of these customers that the startup wanted to solve?
4	How was the solution that the startup would offer to its customers' problems defined (also known as the value proposition)?
5	How was the first iteration of the product or service created?
6	Where did the resources come from to start developing the opportunity?
7	How did the entrepreneur finance the startup's growth?
8	How was an initial strategy developed and implemented to take the product or service to market?
9	Has the strategy development process changed over time? If so, how?
10	How was the new product or service initially marketed?
11	Has the marketing approach changed over time? If so, how?
12	How did the entrepreneur find and recruit people to work in the startup?
13	Has the recruitment process changed over time? If so, how?
14	How was the company's operation defined, to produce the product or service?
15	Has this operation changed over time? If so, how?
16	How would you describe the decision-making approach of the founders and the team in the early days of the startup?
17	Has the decision-making process changed over time? If so, how?
18	Did the entrepreneur relax any of society's rules or norms when bringing their new product or service to the market? If so, how?
19	How would you describe the startup's initial competitive advantage?
20	Has the competitive advantage changed over time? If so, how?
21	Has the entrepreneur left the startup at the time of this interview? If so, describe what the exit process was like.